Title	**Guideline for Fetal Auscultation (including Electronic Fetal Monitoring)**	
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1.0 Introduction

The monitoring of fetal heart rate aims to assess fetal wellbeing, identify hypoxia and instigate appropriate management plans to reduce the chance of poor neurological outcomes for babies.

This guideline has been developed from NICE CG190 and is 100% compliant. Please see https://www.nice.org.uk/guidance/cg190/chapter/Recommendations#monitoring-during-labour

2.0 Objective

To ensure the appropriate monitoring of the fetus in utero by clinical and technical means.

To detect fetal compromise at the earliest instance and reduce the risk of negative outcomes.

3.0 Scope

This guideline applies to all medical and midwifery staff working on the maternity unit and midwives working in community.

4.0 Main body of the document

4.1 Risk Assessment

For all women a risk assessment should be undertaken to determine the most appropriate form of fetal monitoring required taking into consideration the woman's preferences.

The findings of the assessment should be documented in the hand held notes; case notes and/or partogram.

Low risk factors for potential fetal compromise (Table 1)

Maternal factors	Fetal Factors
Gestation 37^{+0}- 42 weeks	**No** suspected Small for Gestational Age (SGA) plotting less than the 10^{th} centile on the customised growth chart at any point in the pregnancy
Uneventful pregnancy	Singleton pregnancy
Spontaneous labour	Cephalic presentation
No predisposing medical conditions	No evidence of significant meconium liquor

NB- significant meconium is defined as dark green or black amniotic fluid that is thick or tenacious, or any meconium stained amniotic fluid containing lumps of meconium.

High Risk factors for potential fetal compromise (Table 2)
This table is not exhaustive. Decisions should be made based on the whole clinical picture.

Maternal Risk factors (Table 2)
Antepartum haemorrhage
Confirmed /Suspected maternal sepsis. Maternal pyrexia (38.0^{o}C on one occasion or 37.5^{o}C on 2) *refer to Guidelines for the care of women with sepsis in pregnancy and the postnatal period.*
Labour induced with prostaglandins or oxytocin
Maternal BMI >30 (consider CTG monitoring depending on clinical picture and the presence of other risk factors)
Maternal medical disease e.g. Diabetes, Thyroid disorders, Renal disease, Epilepsy, Thrombo-embolic disease, Cardiac disease, Obstetric Cholestasis
Maternal tachycardia of ≥120bpm on two readings 30 minutes apart

Pre-eclampsia/eclampsia/Hypertension:
• Single reading
  ○ Systolic ≥160mmHg or
  ○ Diastolic ≥110mmHg or
• 2 readings, 30 minutes apart
  ○ Systolic ≥140mmHg or
  ○ Diastolic ≥ 90mmHg
• Single reading with Proteinuria of ≥ 2+
  ○ ≥140 mmHg
  ○ ≥ 90 mmHg

Pregnancy 42 weeks or over
Prelabour rupture of the membranes (PROM) over 24 hours before active labour
Previous caesarean section or uterine scar

Fetal Risk Factors (Table 2)
Abnormal fetal Doppler's or reduced growth velocity
Fetal growth restriction (or suspected) plotting less than the tenth centile on the customised growth chart at any point in the pregnancy. Ensure an individualised plan of care has been made.
Multiple pregnancy
Oligohydramnios or Polyhydramnios
Prematurity (less than 37 + 0 weeks)
Reduced fetal movements • ≥ Three episodes • >Two episodes and one or more of the risk factors identified using the Reduced Fetal Movement assessment tool (see Reduced Fetal Movement guideline)
Rhesus antibody sensitisation in the unborn baby
Suspected chorioamnionitis or sepsis
Transverse lie, breech or other malpresentation

Intrapartum risk factors (Table 2)	
Abnormal Fetal heart rate (FHR) on auscultation	
Contractions that last longer than 60 seconds (hypertonus), or more than five contractions in ten minutes (tachysystole)	
Delay in first or second stage of labour in primigravidas:	**Delay in first or second stage of labour in multiparous women:**
• Cervical dilatation of less than two cm in four hours for first labours • For second stage of labour in a primigravida where birth is not imminent two hours from the commencement of active second stage, escalate to Registrar and commence continuous CTG monitoring (NICE 2017)	• Cervical dilatation of less than two cm in four hours or a slowing in the progress of labour for second or subsequent labours • For second stage of labour in a multiparous woman, where birth is not imminent one hour from the commencement of active second stage, escalate to a Registrar and commence continuous CTG monitoring (NICE 2017)
For a minimum of 30 minutes after epidural analgesia	
Identified or suspected fetal abnormality or previous stillbirth	

Oxytocin augmentation
Pain reported by the woman that differs from that associated with contractions
Significant meconium stained liquor (Insignificant with one other risk factor)
Vaginal blood loss or fresh bleeding in labour
Woman's request

Social Risk Factors (Table 2)
On-going maternal substance misuse including alcohol

NB – Social factors, in particular, poor access to care, mental health problems, domestic violence and safeguarding issues are risk factors and should be considered when assessing risk factors in relation to CTG monitoring. Lower thresholds for monitoring should be used, especially if there are other risk factors present.

4.2 Process for Intermittent Auscultation

Intermittent Auscultation is performed for low risk women (see table 1). Continuous electronic fetal monitoring (CEFM) in 'low risk' healthy women with straight forward pregnancy is associated with an increased level of intervention without any improvement in perinatal outcome.

The FHR should be auscultated using a Pinnard stethoscope or hand held Doppler only for one full minute and recorded as a single rate. If heard, record any accelerations or decelerations.
The maternal pulse should be simultaneously palpated to determine a difference from the FHR. If a FHR abnormality is detected, the maternal pulse rate should be recorded with the fetal heart rate on the partogram and commence CEFM. IF the CEFM is normal this can be discontinued after 20 minutes.

As per national recommendations hourly risk assessments should be performed for all labouring women. Please complete the risk assessment in Appendix 2.

4.3 Process for performing Electronic Fetal Monitoring

- Explain the procedure to the woman and gain verbal consent
- Perform an abdominal palpation
- Auscultate the fetal heart rate with a Pinnard stethoscope or hand held Doppler
- Check maternal pulse
- Check the machine settings are correct and that the time displayed is the same as any watch/clock being used by the clinician
- Record the woman's name, unit number and pulse rate on the CTG tracing
- Record the date and time the CTG was commenced on the tracing
- Position the TOCO and ultrasound transducers.
- Connect the fetal event marker and show the patient how to use it.

4.4 Monitoring in pre-term infants

Antenatal EFM should not be performed prior to 26 weeks gestation as reliability is less certain due to the immaturity of the central nervous system.
Monitoring should be considered with risk factors (see table 2) between 26 and 28 weeks. If unsure discuss with a senior midwife or Obstetrician.

4.5 Monitoring the fetal heart rate in the antenatal period

Antenatal auscultation is used to confirm that the fetus is alive and provides reassurance but is of no predictive value.

Fetal auscultation and monitoring for high risk women in the antenatal period should be performed according to individual need following risk assessment. Where there are maternal or fetal complications in the pregnancy, this would usually be an indication for an admission CTG. Thereafter the frequency of monitoring will be decided on an individual basis. However, as a guide, this may be a minimum of twice daily (BD).

Women on the antenatal ward who are assessed as high risk but not in labour should have a combination of intermittent auscultation and electronic fetal monitoring according to individual care plans.

Women on the antenatal ward who are low risk but in the latent phase of labour should have a comprehensive assessment of maternal and fetal wellbeing at four hourly intervals. External CTG should be performed if there are any risk factors from the assessment which could impact on fetal wellbeing.

Antenatal CTG tracings - **Computerised CTG (cCTG)**

*Dawes/Redman cCTG to be used if there is **no** palpable uterine activity*

Computerised CTG provides an objective CTG interpretation and is recommended for CTGs performed in the antenatal period (Saving Babies Lives – version two) as it reduces human error and allows communication of robust numerical data rather than opinion. The final clinical judgement should be based on the entire clinical assessment with cCTG forming part of this holistic approach to pregnancy management.

If prolonged monitoring is required due to antenatal condition e.g. active bleeding (APH), conventional non-computerised CTG should be used.

Dawes/Redman criteria can be used for a fetal gestation of 26^{+0} until the woman is in labour. Prior to that gestation, auscultation with Pinnard Stethoscope or Sonic aid is appropriate.

CTGs carried out before 28 weeks should be performed and interpreted with caution. The decision to do so must be made on an individual basis by a senior obstetrician. The fetal autonomic nervous system is not mature and therefore the patterns of fetal heart rate which may be expected at later gestations are not present. Also, there is an increased possibility of signal loss and poor quality CTGs at earlier gestations.

NB - A Computerised CTG is only a clinical diagnostic tool and cannot be used as a predictive or screening test. It only indicates the current fetal state.

Duration of Monitoring

The maximum record length is 60 minutes. The computer analyses the CTG data and compares it with the Dawes/Redman criteria at ten minutes and every two minutes thereafter.
The practitioner commencing the CTG **must** return within ten minutes to ensure the quality and assess visually, whether the monitoring is normal.
It is advised to ensure the patient has the fetal movement button to press.

Abnormal CTG

If the CTG is suspected to be abnormal at any point, an immediate obstetric review **must** be sought.
Whenever the CTG is reviewed during the analysis, the practitioner must sign/annotate to evidence this and any actions taken.

Criteria met

If the cCTG meets the Dawes/Redman criteria, this is a normal result.
Unless there are other clinical concerns, the analysis can be stopped and a report of the analysis is printed.
These criteria can be achieved as early as ten minutes. The cCTG does not need to be continued for the traditional 20 minutes.
The practitioner who stops the cCTG must sign the cCTG at the end of the print out. Complete a visual trace review and assessment, to confirm that the cCTG is normal as per NICE guidance. If the cCTG has continued for twenty minutes or longer then complete the steps as above and complete a preformatted antenatal CTG sticker.

NB Do not rely on the analysis in isolation. Assessment of the whole clinical scenario is important.

Criteria are not met after ten minutes

This indicates that the criteria have not yet been met and normality has not been demonstrated. Reasons for failure to meet the criteria are shown as reason codes (See appendix 3). Unless there are clear pathological features, or any cause for concern, continue the trace. until the criteria are met. Once the criteria are met complete a visual trace review and assessment. If confirmed the CTG is normal, discontinue.

Criteria still not met at 60 minutes

If the criteria are still not met at 60 minutes the computer will end the analysis. At this point, stop the printer to print the results on the trace and turn off the Dawes/Redman assessment. Continue the CTG until a medical review has taken place.
In the context of an antenatal CTG, this must be considered a pathological outcome and appropriate review and action must be taken.

Not meeting the criteria is not necessarily a reason for delivery. Particular attention should be paid to the reasons for failure, visual trace review and a holistic assessment of the pregnancy, in accordance with guidelines and protocols.

The review should be performed by a registrar or consultant to plan further management.

Do not act on the basis of the CTG analysis alone, which is an aid to pregnancy management not a diagnostic tool.

Antenatal CTG tracings using a conventional non-computerised machine

Ideally antenatal CTGs will be interpreted using a computerised CTG. If this is not possible and a non-computerised CTG is used, the CTG will be assessed according to NICE recommendations; the findings should be recorded on the tracing, signed and dated. Any actions resulting from the assessment of the tracing should be documented in the woman's records.

The aim of an antenatal CTG is to confirm fetal wellbeing. Four features will be assessed after a maximum of 40 minutes and classified as normal or abnormal according to the criteria in the table below:

Antenatal CTG (No uterine activity or Uterine activity with no cervical changes)		**Risk factors:**	
Reason for CTG:			
Gestation: **Maternal Pulse:**	**NAME:** **UN:** **D.O.B:**	**Dawes Redman Criteria**	
		Met	
		Not Met	
Baseline rate	110-160bppm	Above 160 or Below 110	
Variability	5-25 bpm	Less than 5bpm	
Accelerations	Present	Absent	
Decelerations	None	Present	
Overall	Normal	Abnormal (seek SpR or above review)	
Plan:			
Signature 1		Date and Time	
Fresh eyes Signature I agree/disagree (not needed if Dawes Redman criteria met)		Date and Time	

Document on the tracing any significant events. This includes any action or occurrence which affects either the quality of the tracing or the fetal heart rate itself.

4.6 Monitoring women undergoing Induction of labour

Computerised electronic fetal monitoring (cCTG) should be used for the **pre-induction** CTG tracing in women who undergo induction of labour unless there are contra-indications. Please see induction of labour guideline

Once uterine activity palpable, use conventional CTG monitoring as per NICE guidelines.

4.7 Monitoring the fetal heart rate in labour

Intermittent auscultation

Intermittent auscultation of the fetal heart rate is recommended for low risk women (see table 1) in established labour in any birth setting.

When a woman is in established labour the fetal heart rate will be recorded on the partogram as follows:

- Every fifteen minutes after a contraction in first stage.
- After every contraction / push with a maximum interval between auscultations of five minutes in second stage.

In labour intermittent auscultation of the fetal heart rate will be recorded as a 'dot' on the partogram (as per the key). In all cases recording the fetal heart rate via intermittent auscultation on the partogram will mean that the fetal heart has been listened to for one full minute after a contraction.

Continuous electronic fetal monitoring

Continuous electronic fetal monitoring will be offered where risk factors for potential fetal compromise have been identified in the antenatal period (see table 2).
The woman should be given the following information before commencing CTG monitoring:

- A CTG will monitor the baby's heart rate and maternal contractions
- Mobility will be restricted
- Labouring or birthing in water may not be possible
- A normal tracing is an indicator of fetal well being
- A tracing that is not normal may indicate that continuous monitoring or changes to the management plan are required
- The woman's preferences will be considered when determining management

The fetal heart rate should be recorded with a cross on the partogram every fifteen minutes (as per key).
A documented systemic assessment following the principles below will be made of the CTG tracing every hour or more frequently if there are concerns.

Following delivery, the date, time, mode of delivery and signature should be recorded on the tracing.

CTG interpretation is a component part of the on-going assessment of fetal wellbeing but should not be reviewed in isolation. Do not make any decision about a woman's care in labour on the basis of the CTG findings alone. When interpreting the CTG tracing consider the current wellbeing of the woman and the unborn baby and progress in labour and consider the following before making any changes to the plan of care:

- How the woman says she is feeling
- Fetal movements as interpreted by the woman
- The woman's clinical observations
- If the membranes have ruptured, whether the liquor is meconium or blood stained
- Vaginal bleeding
- Where applicable maternal medication – including pain relief and Syntocinon
- The frequency of contractions
- The stage and progress in labour
- The woman's parity
- Where applicable the results of any fetal blood sampling and response to fetal scalp stimulation

NB - If it is not possible to categorise or interpret the CTG tracing, then the opinion of a senior obstetrician must be sought.

Assessing the four features When reviewing a CTG trace, assess the four features and categorise the CTG as Normal, Suspicious or Pathological dependent upon your findings:

Baseline Rate	Variability	Accelerations	Decelerations
100-109bpm Continue with usual care if normal variability and no variable or late decelerations but inform the obstetrician (ST4 or above) /co-ordinating midwife.	Intermittent periods of reduced variability are normal especially as part of a sleep pattern.	The presence of accelerations even with reduced variability is generally a sign that the unborn baby is healthy. The absence of accelerations on an otherwise normal CTG does not indicate fetal acidosis.	Early decelerations are uncommon and usually associated with head compression. The longer and later the decelerations the higher the risk of acidosis, especially if Fetal tachycardia and reduced variability

S	**Intrapartum CTG** (Palpable uterine activity) **FRESH EYES 1 hourly**		NAME:			
B	**Risk factors**		UN:			
			D.O.B:			
A	**Pulse:**		**Contractions:** **10 mins**	**Strength:**	**Liquor colour:**	
	Features	**Reassuring**	**Non-reassuring**		**Abnormal**	
	Baseline rate	110-160bpm Rate……	100-109bpm Rate……	160-180bpm Rate……	< 100bpm Rate……	>180bpm Rate ……
	Variability	5-25bpm	<5bpm for	30-50 mins	<5bpm	>50 mins
			>25 bpm for	15-25 mins	>25 bpm	>25 mins
					Sinusoidal	
	Accelerations	Present	None *(The absence in an otherwise normal CTG does not indicated fetal acidosis)*			
	Decelerations *Concerning decelerations :* *>60 seconds* *Reduced variability* *Fail to return to baseline* *Biphasic (W) shape* *No shouldering.*	None	**Variable**		**Variable**	
		Early	**NO** concerning characteristics	>90 min	With **ANY** concerning characteristics on **>50% of contractions >30 mins** *(Less if there are maternal/ fetal risk factors such as bleeding or significant meconium)*	
		Variable with **NO** concerning characteristics for **< 90 mins**	**ANY** concerning characteristics	Up to 50% of contraction >30 min		
			ANY concerning characteristics	>50% of contractions <30 min		
			Late Decelerations		**Late Decelerations**	
			> 50% of contractions	**< 30 mins** (no risk factors)	**For 30 mins** *(Less if there are risk factors)*	
		Acute Bradycardia (prolonged declaration > 3 mins) URGENT intervention THINK 3-6-9				
	Overall	**Normal**	**Suspicious** (TWO features are PATHOLOGICAL)		**Pathological**	
R	Plan:					
	Name/Designation and Signature 1…… 2……		Date and Time ……			

Category	Definition	Management
Normal	All features are reassuring	Continue CTG and normal care If CTG commenced because of concerns raised from IA, consider reverting to IA after 20 mins if all features of CTG are normal
Suspicious	One non-reassuring feature	Correct any underlying causes Perform a full set of maternal observations Inform coordinating midwife or obstetrician Document a plan for review of clinical findings and CTG
Pathological	One abnormal feature **OR** Two non-reassuring features	Request review by experienced obstetrician (ST5 or above) and coordinating midwife Exclude acute events Correct any underlying causes If no improvement after 30 minutes of corrective measures, further review by experienced obstetrician and coordinating midwife Offer digital fetal scalp stimulation and document effect If no response or CTG remains pathological consider either fetal blood sampling OR expediting delivery
Need for urgent intervention	Acute Bradycardia or a single prolonged deceleration for three minutes or more	Urgently seek obstetric help (consider obstetric emergency call) If there has been an acute event, expedite the birth Correct any underlying causes Prepare for urgent birth and expedite birth if persists for nine minutes If heart rate recovers before nine minutes, reassess decision to expedite birth in discussion with the woman.

4.8 Fresh Eyes

A fresh eyes approach has been shown to prevent adverse outcomes where CTG monitoring is utilised. This involves the interpretation/review of the tracing by more than one person i.e. by someone other than the midwife giving on going care and undertaking the hourly assessment. It will be carried out prior to discontinuing CTG monitoring, every hour in the first stage of labour and every 30 minutes in the second stage of labour, unless cCTG (Dawes Redman) analysis is performed and met. If Dawes Redman is not met after 60 minutes the woman must be reviewed by a senior obstetrician (See Appendix 3). The second opinion including a review of the risk factors and CTG categorisation must be documented on the CTG tracing and in the labour records with the date, time and signature, confirming the on-going plan of care.

The fresh eyes review should have a new categorisation sticker completed every hour.

If there is non-agreement on the categorisation of the CTG, this should be documented on the woman's records and a further opinion will be sought from a senior person (midwife or obstetrician).
If there is still disagreement the CTG will be reviewed by the Consultant Obstetrician. The final agreed categorisation will be documented on the CTG and in the woman's records with a management plan.

Conservative Measures

Inform the shift leader when conservative measures have been implemented.

Contributing Factor	Corrective Measure
Maternal position	• Encourage the woman to mobilise • Adopt an alternative position (avoid being supine)
Dehydration; maternal tachycardia (may represent infection)	• Intravenous fluids therapy- 500mls 0.9% sodium chloride
Hypotension - usually secondary to regional anaesthetic or vasovagal episode	• Check blood pressure • Change maternal position to left lateral • Give iv fluid bolus • Anaesthetic review
Maternal pyrexia	• Intravenous fluids therapy- 500mls • Paracetamol 1g (oral or IV)
Possible sepsis	• Perform screening investigations • Instigate treatment (paracetamol and IV antibiotics)
Uterine hypercontractility on syntocinon	• Stop syntocinon infusion
Uterine hypercontractility (not on syntocinon)	• Consider tocolysis - terbutaline 0.25mg by subcutaneous injection

Contributing Factor	Corrective Measure

CTG tracing is poor
 	
(In all cases ensure that the fetal heart rate is auscultated and recorded. If on auscultation the fetal heart rate is thought to be abnormal appropriate action should be taken)
	• Ensure monitoring leads are functioning correctly
	• Record maternal observations and determine the difference between maternal pulse and fetal heart rate
	• Document any external factors (bed pan/vomiting/vaginal examination)
	• Position the woman
	• Apply/re-apply fetal scalp electrode (where appropriate) ARM if necessary for the application of FSE
	  ○ FSE monitoring is contraindicated in women with any blood borne disease or suspected fetal bleeding disorder
	  ○ **Prematurity < 34 weeks unless discussed with a senior obstetrician (ST4 and above) and the benefits outweigh the risks**
	If after 20 minutes the tracing continues to be poor
	• Inform senior obstetrician (ST4 or above)
	• Revert to conventional monitoring
	• Consider fetal blood sampling

NB. Maternal facial oxygen should only be given for maternal resuscitation or as preoxygenation prior to anaesthesia. There is no benefit in giving maternal facial oxygen for intrauterine resuscitation and it may be harmful to the fetus.

4.9 Actions to be taken in the event of a poor quality CTG tracing

Full interpretation of a CTG tracing is only possible if:

- The CTG settings are appropriate
- The time is accurate
- The woman's details are accurately recorded
- The transducer is recording the fetal heart rate consistently
- There are no interruptions to the CTG tracing
- The TOCO lead is recording the length and frequency of contractions

5.0 Indications for undertaking fetal blood sampling

5.1 FBS and informed choice

When offering an FBS the following should be discussed with the woman:

- Why the test is advised
- What the test measures (i.e.) the level of acid in the babies blood to give an indicator as to how the baby is coping with labour
- The procedure and that it involves taking a blood sample form the baby's head / scalp
- The possible outcomes

- The chance that the procedure may not be successful and the implications for further management
- If the woman has suspected or confirmed sepsis the results may be falsely reassuring leading to uncertainty regarding their significance

5.2 When to perform FBS

The decision to perform an FBS is made by the Obstetric Registrar or Consultant on duty.

Clinicians should consider the time that it will take to achieve birth by both instrumental vaginal birth and caesarean section when making decisions regarding concern over fetal wellbeing in labour.

FBS should only be performed when indicated by a pathological CTG when the CTG has not improved with conservative measures and fetal scalp stimulation

5.3 When not to perform FBS

- When there is an acute event (e.g.) cord prolapse, placental abruption or uterine rupture)
- When clinical picture or an abnormal CTG suggests immediate delivery
- When the CTG is normal.
- When the changes are due to oxytocic over stimulation
- During or soon after an episode of prolonged bradycardia without allowing a period of recovery if the CTG is otherwise normal
- If spontaneous vaginal delivery is imminent or easy instrumental delivery can be performed
- In the presence of blood borne disease (for example: HIV, Hepatitis viruses and herpes simplex virus)
- Suspected fetal bleeding disorders
- Prematurity (< 34 weeks)

NB - FBS results may be falsely reassuring in women with sepsis or where there is significant meconium – discuss with Consultant obstetrician. In the case of suspected or confirmed sepsis the decision to perform an FBS and the interpretation of any results should consider:

- The woman's preferences
- The stage and progress in labour
- Parity
- The likelihood of chorioamnionitis

Repeat samples should be undertaken with caution following discussion with the Consultant Obstetrician.

5.4 Procedure

A professional who is trained and deemed competent to perform FBS will carry out the procedure.

- Obtain verbal consent and record on the partogram
- Position the patient in a left lateral position
- Use appropriate amnioscope, with introducer
- Clean the area of the scalp where the sample is to be taken
- Coat the scalp surface with yellow soft paraffin

- Incise the scalp with a guarded blade
- Collect sample in a capillary tube
- Analyse blood sample immediately

5.5 Interpretation of results

The result will appear on the display screen of the FBS machine and will be printed out.

FBS result (pH)	Interpretation
≥ 7.25	Normal FBS result
7.21–7.24	Borderline FBS result
≤ 7.20	Abnormal FBS result

Base Excess result	Interpretation
Base excess > -2mmol/l	Normal
Base excess -2 to -8 mmol/l	Pre-asphyxia
Base excess < -8 mmol/l	Asphyxia

The pH and base excess should be considered together. An acute and reversible form of asphyxia (i.e.) following an epidural top up may present with acidosis but normal base excess.

Very negative values for the base excess implies that there has been considerable acidosis present for some time which has required the utilisation of buffers (bases) rather than bicarbonate to counteract it with a resultant anaerobic metabolism. The neonate may be adversely affected therefore requires careful observation.

If the result is normal offer a further sample in 60 minutes if still indicated by the CTG tracing or sooner if additional non-reassuring or abnormal features develop.

If the result is borderline offer a further sample in 30 minutes if still indicated by the CTG or sooner if additional non-reassuring or abnormal features develop.

NB – consider the time it will take to perform the procedure when planning the timing.

If following the second sample the lactate, pH and the CTG tracing remains unchanged further samples may be deferred unless additional non-reassuring or abnormal features develop on the CTG.
Inform the consultant obstetrician if:

- The result is abnormal
- A blood sample cannot be obtained
- A third sample is thought to be needed

Interpret the FBS results and develop a management plan considering:

- Any previous measurements
- The rate of progress in labour
- Clinical features of the woman and/or baby

If the procedure is attempted and a sample cannot be obtained but the associated scalp stimulation results in fetal accelerations:

- Discuss the findings, including the clinical picture and any other risk factors with the Consultant obstetrician and decide whether to continue with the labour or deliver the baby

If a sample cannot be obtained and there is no improvement in the CTG tracing:

- Discuss the findings with the Consultant obstetrician and expedite the delivery of the baby

The results and the management plan will be discussed and agreed with the woman and recorded on the partogram.

5.6 Paired cord pH samples

Obtain arterial and venous cord samples for analysis in the following cases:

- Multiple pregnancy
- Babies of diabetic mothers
- Babies with intra-uterine growth restriction
- Preterm labour
- All deliveries which take place in Labour ward theatre
- Instrumental deliveries
- Caesarean sections performed for suspected or confirmed fetal compromise
- Shoulder dystocia
- Vaginal breech delivery
- Abnormal CTG
- Prolonged second stage
- Meconium liquor
- Fetal blood sampling in labour
- Women with an intrapartum temperature of >38.0°C
- Low Apgar scores (< 4)
- Babies admitted to the Neonatal Unit from the Labour ward

Ideally samples should be taken and analysed at delivery, however samples can be taken from a clamped section of the cord at room temperature up to 30 minutes. Samples should be taken in heparinised plastic syringes. If it is not possible to analyse the samples immediately after taking them they can be stored in the fridge for up to 60 minutes.

If cord samples are taken it is good practice to record the time the cord was clamped.

Record the results on the partogram.

5.7 Storage of FBS and cord pH results

FBS results:

Place the print out in an envelope with the woman's name, DOB, and unit number clearly marked on the front. File the envelope in the maternal notes

Cord pH Results:

Place the print out in an envelope with the baby's DOB, and unit number clearly marked on the front. File the envelope in the paediatric notes.

NB *fetal blood sampling screens for acidaemia/hypoxia, it may be of less value in the presence of pyrexia (which could be an indicator of sepsis).*

Fetal blood sample result (pH)	Interpretation	Subsequent action
≥7.25	Normal	FBS should be repeated within no more than one hour if the FHR abnormality persists or sooner if additional non-reassuring or abnormal features are seen
7.21-7.24	Borderline	Repeat FBS within 30 minutes if the FHR abnormality persists or consider delivery if rapid fall since last sample
≤7.20	Abnormal	Inform Consultant and agree plan for delivery
Sample indicated but cannot be obtained		Inform the Consultant. If there is acceleration of the fetal heart in response to the scalp stimulation take this into account when deciding whether to expedite the birth. If there is no improvement in the fetal heart rate trace, advise the woman that the birth should be expedited and discuss options.

6.0 Storage of tracings

Tracings should be filed in the appropriate envelope and secured in the woman's records in accordance with the Record Keeping Guideline.

7.1 Monitoring of women undergoing a Caesarean section

Women undergoing Elective Caesarean Section should have the fetal heart rate auscultated immediately prior to knife to skin, following anaesthesia. The fetal heart and method of auscultation should be recorded on the partogram. The midwife should ensure the surgeon is aware of the fetal heart rate prior to commencing the procedure.

Women undergoing Emergency Caesarean Section should have continuous fetal heart rate monitoring up to cleaning the abdomen. The surgeon should be aware of the fetal heart rate prior to commencement of the procedure

8.0 Roles and responsibilities for the Midwives and Obstetricians

To provide the best evidence-based care for women in accordance with appropriate guidance from diagnosis to delivery.

8.1 Associated documents and references

National Institute for Health and Care Excellence. Clinical guideline 62. Antenatal care: Routine care for the healthy pregnant woman, (2008). https://www.nice.org.uk/guidance/cg62/resources/antenatal-care-for-uncomplicated-pregnancies-pdf-975564597445

National Institute for health and Care Excellence. Clinical guideline 190. Intrapartum care: care of healthy women and their babies during childbirth (2014 updated 2017). https://www.nice.org.uk/guidance/cg190/resources/intrapartum-care-for-healthy-women-and-babies-pdf-35109866447557

National Institute for Health and Care Excellence. Clinical guideline 121 Intrapartum care for women with existing medical condition or obstetric complications and their babies (2019). https://www.nice.org.uk/guidance/ng121/resources/intrapartum-care-for-women-with-existing-medical-conditions-or-obstetric-complications-and-their-babies-pdf-66141653845957

NHS England Saving babies lives version 2: A care bundle for reducing perinatal mortality (2019) [online] www.england.nhs.uk

9.0 Training and resources

Training will be facilitated as outlined in the Maternity Training Needs Analysis. This is updated on an annual basis.

10.0 Monitoring and audit

Any adverse incidents relating to fetal auscultation will be monitored via the incident reporting system. Any problems will be actioned via the case review and root cause analysis action plans. The action plans are monitored by the risk midwife to ensure that improvements in care are made. The trends and any root cause analysis are discussed at the monthly risk meetings to ensure that appropriate action has been taken to maintain safety.

The guideline for Fetal Auscultation (including Electronic Fetal Monitoring) will be audited in line with the annual audit programme, as agreed by the CBU. The audit action plan will be reviewed at the monthly risk management meetings on a quarterly basis and monitored by the risk midwife to ensure that improvements in care are made.

11.0 Equality and Diversity

The Trust is committed to an environment that promotes equality and embraces diversity in its performance as an employer and service provider.

It will adhere to legal and performance requirements and will mainstream equality, diversity and inclusion principles through its policies, procedures and processes. This guideline should be implemented with due regard to this commitment.

To ensure that the implementation of this guideline does not have an adverse impact in response to the requirements of the Equality Act 2010 this policy has been screened for relevance during the policy development process and a full equality impact assessment is conducted where necessary prior to consultation. The Trust will take remedial action when necessary to address any unexpected or unwarranted disparities and monitor practice to ensure that this policy is fairly implemented.

This guideline can be made available in alternative formats on request including large print, Braille, moon, audio, and different languages. To arrange this please refer to the Trust translation and interpretation policy in the first instance.

The Trust will make reasonable adjustments to accommodate any employee/patient with particular equality, diversity and inclusion requirements in implementing this guideline. This may include accessibility of meeting/appointment venues, providing translation, arranging an interpreter to attend appointments/meetings, extending policy timeframes to enable translation to be undertaken, or assistance with formulating any written statements.

12.0 Recording and Monitoring of Equality & Diversity

This section is mandatory for all Trust Approved Documents and must include the statement below:

The Trust understands the business case for equality, diversity and inclusion and will make sure that this is translated into practice. Accordingly, all guidelines will be monitored to ensure their effectiveness.

Monitoring information will be collated, analysed and published on an annual basis as part of Equality Delivery System. The monitoring will cover the nine protected characteristics and will meet statutory employment duties under the Equality Act 2010. Where adverse impact is identified through the monitoring process the Trust will investigate and take corrective action to mitigate and prevent any negative impact.

Appendix 1

Glossary of terms

BHNFT – Barnsley Hospital NHS Foundation Trust
cCTG – Computerised CTG
CTG – Cardiotocograph
CEFM-Continuous Electronic Fetal Monitoring
FHR – Fetal heart rate
IUGR – Intra-uterine growth retardation
NHS – National Health Service
NICE – National Institute for Clinical Excellence
LTV – long term variation
STV – Short term

Appendix 2 Fetal monitoring risk assessment

Fetal Monitoring Risk Assessment

Inclusion criteria for intrapartum Continuous Electronic Fetal Monitoring (CEFM) and indicators to convert from Intermittent Auscultation (IA) to CEFM	
Maternal indication	**Fetal Indication**
Gestation <37 or > 42 weeks	Abnormal Doppler artery
Induced labour – low risk women with post-dates induction may be suitable for IIA	Fetal structural abnormalities diagnosed during the antenatal period and planned for CEFM
Delay in first or second stage of labour	
Administration of oxytocin	Oligohydramnios or polyhydramnios
Pre-eclampsia	Multiple pregnancy (all babies to be monitored)
Ante/ Intrapartum haemorrhage (Any vaginal blood loss other than a show)	Known or suspected IUGR
Previous uterine scar (caesarean section or myomectomy)	Known or suspected small for gestational age or tailing growth
Persistent pain in between contractions/ pain inconsistent with that normally associated with labour	Malpresentation
Tachysystole (contractions > 5:10) or hypertonia (sustained uterine contractions lasting >60 seconds)	Undiagnosed breech presentation; transverse or oblique lie (review mode of delivery)
Before, during and after epidural/ spinal procedure and following every epidural top up thereafter (Can be discontinued after 30 minutes if normal unless there is another indication).	Meconium stained liquor
Prolonged rupture of membranes > 24 hours unless delivery is imminent	Evidence of a rising fetal heart rate in IA ≥10%
Maternal pyrexia (defined as ≥38.0 °C once or ≥37.5°C on two consecutive occasions 1 hour apart)	Fetal heart rate below 110 or above 160 beats/ minute, or if baseline is perceived as inappropriate for gestational age
Pulse ≥120 beats/minute on 2 occasions 30 minutes apart	Recurrent Accelerations immediately following a contraction i.e. overshoot
A single reading BP • Systolic ≥ 160mmHg or Diastolic ≥ 110 mmHg	Decelerations in fetal heart rate heard on IA immediately after contractions
A single reading with ≥2+ proteinuria • Systolic ≥ 140 mmHg or • Diastolic blood pressure ≥ 90mmHg	Reduced fetal movements in the last 24 hours reported by the woman
Two consecutive readings (30 minutes apart) • Systolic blood pressure ≥140 mmHg or • Diastolic blood pressure ≥ 90mmHg	Suspected or confirmed chorioamnionitis
• Maternal infection or sepsis	**The table is not exhaustive; any condition which is thought to increase the risk of fetal hypoxia mandates the recommendation of (CEFM).** **If no risk factors are identified, use IA. Remember to continually asses and if indicated convert to CEFM.** **If risk factors are identified, proceed to CEFM and review as per guideline.**
On-going substance misuse	
Maternal illness (e.g. Type 1 and 2 diabetes, gestational diabetes- insulin controlled, obstetric cholestasis, hyperthyroidism, cardiac or renal disease). Offer CEFM to women who develop gestational diabetes but do not require insulin to achieve glycaemic control	
Maternal request	

Author: N Geldart v1 Approved 26/05/2021 Review 26/05/2024

Patient sticker

NHS
Barnsley Hospita
NHS Foundation Trus

Low Risk Intrapartum Risk Assessment

If a woman scores has a score ≥1 offer CEFM *This is not an exhaustive list. Please seek advice from obstetrician or co-ordinator

Developing Risk Factors (This is ongoing assessment that should be documented hourly as a minimum)	Date/time	Date/time	Date/time	Date/time	Date/time	Date/time	Date/time	Date/time	Date/time	Date/time
Pulse ≥ 120bpm x2 30 min apart										
BP≥ 160/110 **or** 2+ proteinuria BP ≥140/90 **or** X2 ≥140/90 30 mins apart										
Tachystole (>5:10) **or** Hypertonia (>60 secs)										
Maternal Pyrexia ≥38°C **or** ≥37.5°C x2 1 hr apart										
Significant Meconium liquor										
APH or Bloodstained liquor										
Delayed 1st **or** 2nd stage of labour										
Baseline rise >10% **or** deceleration/ acceleration after contractions on IA										
No risk factors identified										

Appendix 3 - Dawes Redman – Quick reference Guide

Do not act on the basis of the CTG analysis alone – it is an aid to pregnancy management not a diagnostic tool

Confirm the rationale for CTG
Is there a maternal or fetal condition or disease that will negatively impact fetal development?

→ **NO** → CTG **not** indicated

YES

Is the pregnancy beyond 26^{+0} weeks gestation?
(CTG between 26-28 weeks require senior obstetrician decision)
CTG should not be undertaken prior to 28 weeks for reduced fetal movements

→ **NO** → CTG **not** indicated
Auscultate with Pinnards or sonicade

YES

Commence Dawes Redman Recording
(The first result is available in 10 minutes and every 2 minutes thereafter until a maximum of 60 minutes)
There must be no deceleration or artefact at the end of the recording

Criteria Met
Visually review and classify the CTG. If this is normal and there are no other ongoing clinical concerns, the analysis can be stopped.

This can be with as little as 10 minutes recording time. The printer will produce a report of the analysis results

Do not review the numeric data as the CTG has been classed as normal and this data is therefore insignificant

Criteria not met before 60 minutes

Unless there are clear abnormal features, or any cause for concern, continue the recording until the criteria are met

Short-term variation (STV) is uninterpretable prior to 60minutes. Do not review the numeric data

Do not prematurely stop the CTG. If the analysis has been stopped before the criteria are met and before 60 minutes **IT IS NOT VALID**

Criteria not met after 60 minutes of analysis

Indicates that normality has not been demonstrated
In the context of antenatal CTG classification, this is an abnormal outcome

The woman must be reviewed by a senior obstetrician and action taken based on the reasons for failure, visual trace review and holistic assessment of the pregnancy

The STV should be considered and the trend reviewed if previous analysis has been performed. It has a predictive value for fetuses at risk of metabolic acidaemia and IUD

STV cannot be assessed visually. It can only be assessed with a full 60 minutes of analysis
STV must not be used in isolation as an indicator for fetal condition

STV values
≥4ms is normal
<4ms is low
<3ms is abnormal
<2ms is highly abnormal

Appendix 4
Performing computerised CTG (cCtg)- Applying the Dawes/Redman criteria

The Huntleigh type of CTG machines in ANDU, Maternity Assessment Unit and the ANPN ward are able to perform Dawes/Redman CTG analysis.

Turn the analysis on and ensure the gestation, patient's name and hospital number, maternal pulse, date and time are clearly recorded.

NB - the analysis will not start unless the gestation is entered.

Reasons for not meeting Dawes/Redman Criteria and Actions

1. Basal Heart Rate outside normal range
The FIGO and NICE guidelines agree that a normal baseline fetal heart rate for a term fetus is 110 – 160 beats per minute. Baseline FH Rates must be assessed in consideration of expected baseline for a fetus of the gestation being monitored.
The Dawes/ Redman analyses the intervals between beats and converts into a Basal Heart Rate. Basal rate is not the same as baseline rate and may deviate significantly from a visual assessment of baseline rate.

2. Large decelerations
These will be unprovoked decelerations. Review by obstetric Registrar.
Immediate intervention if the trace is otherwise abnormal, or significant clinical concerns.
If the trace is otherwise normal and there are no clinical concerns, the CTG should be repeated later, as per Obstetric Registrar management plan.

3. No episodes of high variation
Long Term Variation (LTV) is essentially equivalent to traditional baseline variability.
Measured over a 1 minute sample, the difference between the high and low FH values is analysed.
Important evidence of normality is the episodic variation in the baseline heart rate. LTV is reported as "High" or "Low" episodes.
In deep sleep the fetal heart rate is relatively constant with lower short-term variation but this should not normally exceed 50 minutes.

4. No movements and fewer than 3 accelerations.
This is significant and requires review by the obstetric team.

5. Baseline fitting is uncertain
If all else is normal and the baseline falls within normal parameters then this can be ignored.

6. Short-term variation (STV) is less than 3ms
Short-term variation is a computerised measure of the micro fluctuations of the fetal heart. These are not visible to the human eye.

A value of less than 3ms is strongly linked to the development of metabolic acidaemia and impending intrauterine death. Particularly with the absence of an episode of high variation.

STV can only be analysed after a full 60 minutes.

STV of less than 3ms is significant and should be discussed and reviewed by the Obstetric Registrar or Consultant.

STV (ms)	**<2.6**	**2.6-3.0**	**>3.0**
Metabolic acidaemia	10.3%	4.0%	2.7%
IUD	24.1%	4.3%	0.0%

The table represents the association of STV and perinatal outcomes. Therefore, a short-term variability (STV) of < 3ms should be considered significant and the care should be discussed with the Obstetric/ Fetal Medicine Consultant. Expectant management with STV between 2.6 and 3.0 can be considered at very early gestations (<28 weeks) with intense monitoring and supervision from a fetal medicine team.

Urgent review is required if the CTG is visually categorised as abnormal according to NICE criteria

7. Possible error at end of the record
This occurs when the machine detects a possible abnormality at the end of the trace which would otherwise be passed as CRITERIA MET.
In this event the trace may be continued or, if the clinical evaluation is that it is significantly abnormal, for example prolonged deceleration, then action should be taken as appropriate. Review by Obstetric Registrar or Consultant on call.

8. Deceleration at the end of the record
In this event the trace should be continued and action taken as appropriate. Review by Obstetric Registrar or Consultant on call.

9. High frequency sinusoidal rhythm
Sinusoidal FHR patterns are associated with either severe fetal anaemia or severe/prolonged fetal hypoxia with acidosis and are associated with poor fetal outcomes.
The analysis of the Dawes Redman system should be acted on immediately and discussed with the Obstetric Registrar or Consultant on call.

10. Suspected sinusoidal rhythm
Sinusoidal FHR needs to be distinguished from a pseudosinusoidal FHR which, while it closely resembles a sinusoidal pattern, is usually transient, resolves spontaneously and is associated with a good fetal outcome.
Where a diagnosis of Sinusoidal FHR pattern is made, immediate intervention is required with probable emergency delivery if intrauterine resuscitation is not appropriate.
The CTG should be continued.
Maternal blood should be taken for an urgent Kleihauer test to assess the degree of any feto-maternal haemorrhage.
The Obstetric Registrar, Obstetric Consultant, Neonatal Paediatricians and Haematologist, should be alerted.

11. Long-term variation in high episodes below acceptable level
This should be acted upon in the same way as STV.

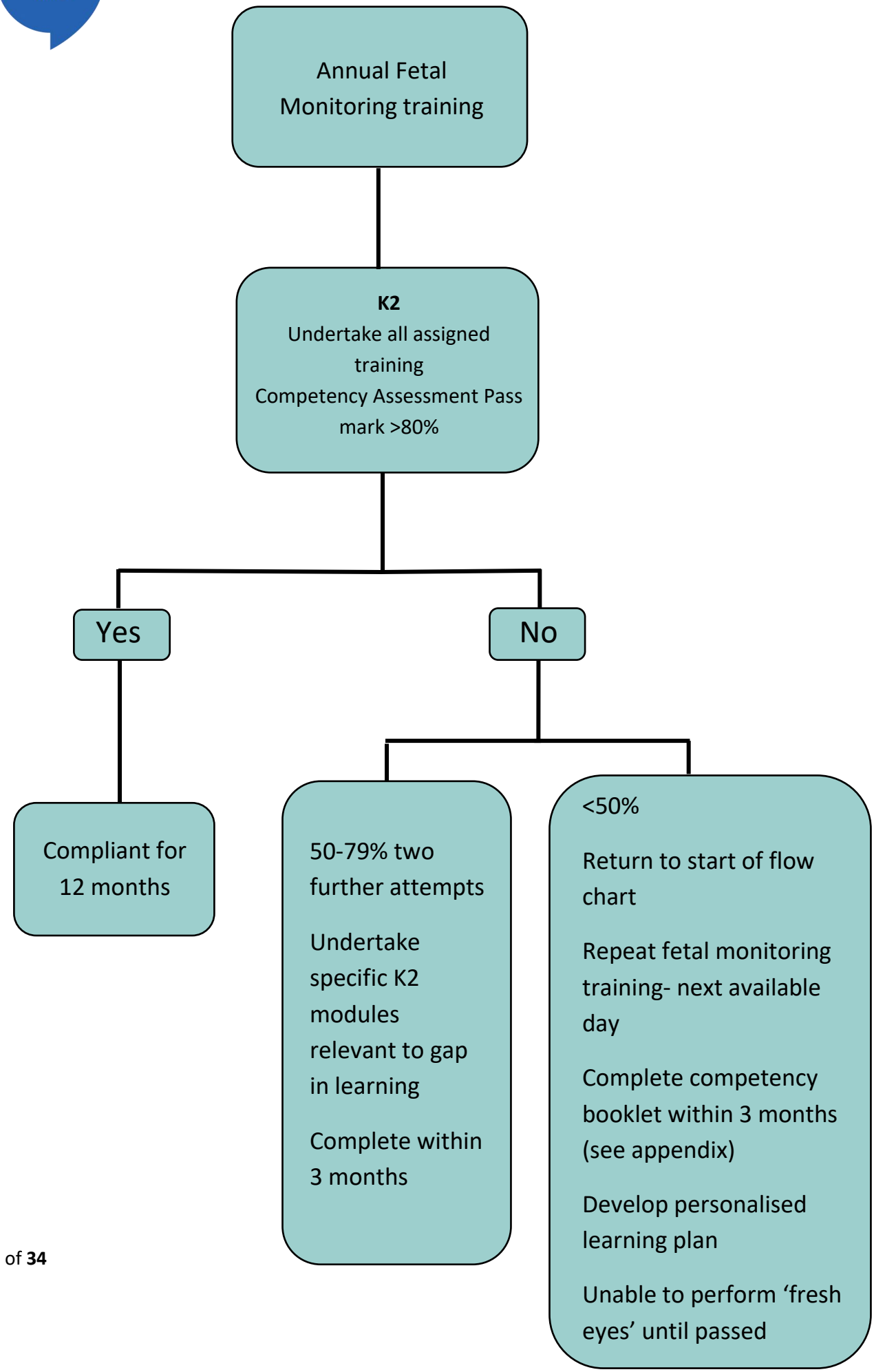
12. No accelerations
In this event the CTG trace should be continued but should be reviewed by Obstetric Registrar or Consultant.

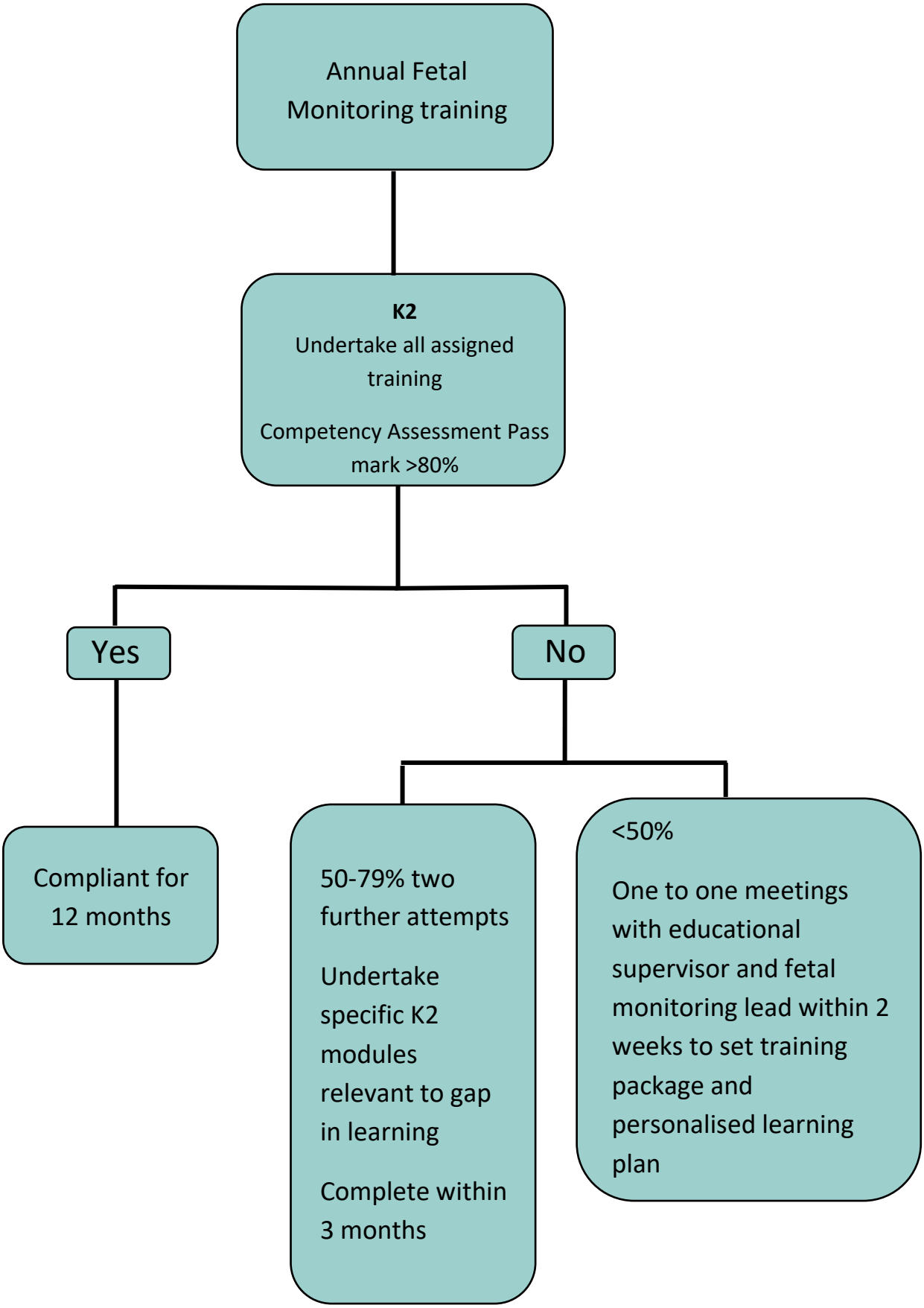
(Dawes Redman analyses acceleration using a slightly lower threshold (>10bpm) than FIGO and NICE definitions).

DO NOT RELY ON THE ANALYSIS IN ISOLATION
It may not always identify abnormal patterns that may be more obvious from visual interpretation with a holistic expert assessment of the whole clinical scenario.

Appendix 5 – CTG Assessment and Interpretation – Quick reference guide

CTG Tracing Assessment and Interpretation (March 2017 – Based on Nice Guidance).			
Accelerations	**The presence of fetal heart rate accelerations, even with reduced baseline variability is generally a sign that the baby is healthy.**		
Features	**Reassuring**	**Non-reassuring**	**Abnormal**
Baseline Rate	110 – 160 bpm	100 – 109bpm or 160 – 180bpm	Below 100 or above 180 bpm.
Baseline Variability	**5 – 25**	• Less than 5 for 30 to 50 minutes • More than 25 for 15 to 25 minutes	• Less than 5 for more than 50 minutes • More than 25 for more than 25 minutes • Sinusoidal
Decelerations	• None or early • Variable decelerations with no concerning characteristics for less than 90 minutes	**Variable Decelerations** • With no concerning characteristics for 90 minutes or more. • With any concerning characteristics in up to 50% of contractions for 30 minutes or more. • With any concerning characteristics in over 50% of contractions for less than 30 minutes.	**Variable Declarations** • With any concerning characteristics in over 50% of contractions for 30 minutes (or less if there are any maternal or fetal risk factors). **Late Decelerations** • For 30 minutes (or less if there are any maternal or fetal risk factors).
		Late Decelerations • In over 50% of contractions for less than 30 minutes with no maternal or fetal clinical risk factors	**Acute Bradycardia** (Or a single prolonged deceleration lasting 3 minutes or more).
Categorisation	**Normal** **All features are reassuring**	**Suspicious**	**Pathological** **1 Abnormal feature or 2 non-reassuring features**
Action	• Continue CTG (unless it was started because of concerns arising from intermittent auscultation and there are no on-going risk factors).	• Correct any underlying causes such as hypotension or uterine hyperstimulation. • Perform a full set of maternal observations • Start one or more conservative measures • Inform an obstetrician or a senior midwife • Document a plan for reviewing the whole clinical picture and CTG findings.	• Obtain a review by an obstetrician and a senior midwife • Exclude cord prolapse, suspected placental abruption or uterine rupture. • Correct any underlying causes such as hypotension or uterine hyperstimulation. • Start 1 or more conservative measures **If the CTG is still pathological after implementing conservative measures**: • Obtain further review by an obstetrician and a senior midwife. • Offer digital scalp stimulation and document outcome. **If the CTG is still pathological after fetal scalp stimulation:** • Consider fetal blood sampling • Consider expediting the birth taking the woman's preferences into account.
	Acute Bradycardia needs urgent intervention	• Urgently seek obstetric help • If there has been an acute event – expedite the birth. • Correct any underlying causes such as hypotension or hyperstimulation. • Start 1 or more conservative measures • Prepare for urgent birth considering the woman's preferences • Expedite birth if bradycardia lasts more than 9 minutes • If the Fetal heart rate recovers at any time up to 9 minutes, reassess any decision to expedite the birth in discussion with the woman.	
Concerning Characteristics of variable decelerations are defined as: Lasting more than 60 seconds, Reduced baseline variability within the deceleration, Failure to return to baseline, Biphasic (W) shape, No Shouldering.			
Conservative Measures are defined as: Encourage woman to mobilise or adopt an alternative position, avoid being supine, offer intravenous fluids if the woman is hypotensive, reduce contractions by stopping oxytocin if it is being used and / or offering a tocolytic drug.			


Annual Fetal Monitoring training
K2
Undertake all assigned training
Competency Assessment Pass mark >80%
Yes
No
Compliant for 12 months
50-79% two further attempts
Undertake specific K2 modules relevant to gap in learning
Complete within 3 months
<50%
Return to start of flow chart
Repeat fetal monitoring training- next available day
Complete competency booklet within 3 months (see appendix)
Develop personalised learning plan
Unable to perform 'fresh eyes' until passed


Annual Fetal Monitoring training
K2
Undertake all assigned training
Competency Assessment Pass mark >80%
Yes
No
Compliant for 12 months
50-79% two further attempts
Undertake specific K2 modules relevant to gap in learning
Complete within 3 months
<50%
One to one meetings with educational supervisor and fetal monitoring lead within 2 weeks to set training package and personalised learning plan

Appendix 6 Document History and Version Control
Maintain a record of the document history, reviews and key changes made (including versions and dates)

Version	Date	Comments	Author

Review Process Prior to Ratification:

Name of Group/Department/Committee	Date
Maternity Guideline group	08/12/2020
Women's Business and Governance Meeting	18/12/2020
CBU 3 Overarching Governance Meeting	
Trust NICE Clinical guidelines meeting	

Trust Approved Documents (policies, clinical guidelines and procedures)

Approval Form

complete the following information and attach to your document when submitting a policy, clinical guideline or procedure for

Document type (policy, clinical guideline or procedure)	Guideline
Document title	**Guideline for Fetal Auscultation (including Electronic Fetal Monitoring)**
Document author (Job title and team)	Fetal Monitoring Lead Midwife Fetal Monitoring Lead Obstetrician
New or reviewed document	Reviewed
List staff groups/departments consulted with during document development	
Approval recommended by (meeting and dates):	**WB&G 16/09/22** **CBU3 B&G 28/09/22**
Date of next review (maximum 3 years)	28/09/2025
Key words for search criteria on intranet (max 10 words)	CTG, Dawes Redman, FBS, Fetal blood sampling

Key messages for staff (consider changes from previous versions and any impact on patient safety)	
I confirm that this is the FINAL version of this document	**Name: Molly Claydon** **Designation: Governance Support Co-ordinator**

COMPLETION BY THE CLINICAL GOVERNANCE TEAM

Approved by (group/committee): **CBU3 Governance**

Date approved: 20/09/2022

Date Clinical Governance Administrator informed of approval: 02/11/2022

Date uploaded to Trust Approved Documents page: 03/11/2022